

FIVE NEW MINING LEPIDOPTERA (NEPTICULIDAE, BUCCULATRICIDAE) FROM CENTRAL ASIA

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Three new species of Nepticulidae (*Stigmella johansoni* sp. n., *Fomoria flavimacula* sp. n., *F. lacrimulae* sp. n.) and two new Bucculatricidae (*Bucculatrix multicornuta* sp. n., *B. macrognathos* sp. n.) are described from the mountains of Turkmenistan, Tadzhikistan and southern Kazakhstan.

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Key words. – Leaf-miners, Nepticulidae, Bucculatricidae, new species, Central Asia.

The growing international concern over the biodiversity crisis has revitalized biological systematics. Committed efforts to the inventory the world's major biota have never been more needed than now. In this light the Zoological Department of the Vilnius Pedagogical University started in 1995 to revise the fauna of the mining Lepidoptera of Central Asia. The generally small primitive leaf-mining Lepidoptera have been relatively poorly studied on a global scale, the fauna of such vast areas as Central Asia being almost completely neglected until recently (Puplesis et al. 1996c). This study comprises most taxa of lepidopteran miners. The work on these groups was divided among entomologists of our department as follows: Nepticulidae, Opostegidae, Tischeriidae and Bucculatricidae by R. Puplesis and A. Diškus; Heliozelidae and Elachistidae by V. Sruoga; Lyonetiidae, Gracillariidae and Phyllocnistidae by R. Noreika and karyological studies by J. Puplesienė. Some other families, such as Eriocraniidae, Momphidae and Coleophoridae, currently studied at the Zoological Institute of the Russian Academy of Sciences (St. Petersburg), were not considered in our project.

Surveys on all the microlepidopteran families studied by us are now in a preparation. The present paper includes just the report of five hitherto undescribed species. To have their names available for an updated check-list (Puplesis et al. 1996) we describe these here. The combination of phylogenetically not related taxa (Nepticulidae and Bucculatricidae) in this paper was purely for practical reasons.

The Nepticulidae of Central Asia have been re-

viewed by Puplesis (1994), the Bucculatricidae by Seksjaeva (1993). In addition, five other species of Nepticulidae (*Acalyptris argyraspis*, *Etainia leptognathos*, *E. obtusa*, *Stigmella cerasi*, *S. aflatuniae*) were recently described by Puplesis & Diškus (1995, 1996a, 1996b). Some more species will be described in forthcoming papers. Methods, terminology and nomenclature used in the descriptions follow Seksjaeva (1989, 1993) and Puplesis (1994).

The genus *Fomoria* Beirne (Nepticulidae) is treated here as a separate genus, not a subgenus of *Ectoedemia* Busck (i.e. van Nieukerken 1986). However, as has been stated by van Nieukerken (1986), the monophyly of *Fomoria* is still not established. Thus any decisions on rank or validity of this taxon are still to be regarded as provisional.

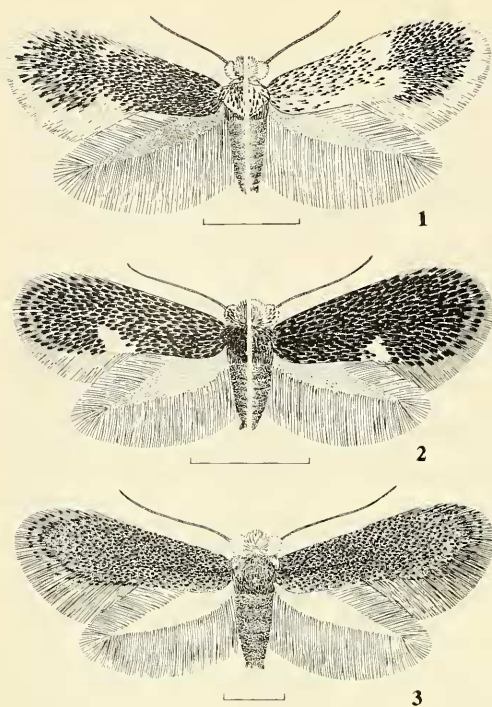
Abbreviations for depositories: RMNH (Nationaal Natuurhistorisch Museum, Leiden, Netherlands), VPU (Vilnius Pedagogical University, Lithuania), ZITAS (Zoological Institute of the Turkmenian Academy of Sciences, Turkmenistan). Diškus

DESCRIPTIONS

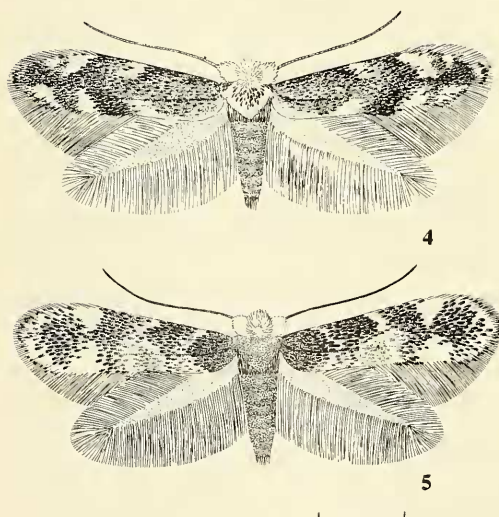
Nepticulidae

Stigmella johansoni sp. n.
(figs. 1, 6-9, 28)

[*Stigmella salicis* (Stainton); Puplesis 1994: fig. 350. misidentification]



Figs. 1-3. Adult Nepticulidae. — 1, *Stigmella johanssoni*, male, showing variation in 2 paratypes; 2, *Fomoria flavimacula*, right side female paratype (central Tadzhikistan), left side male holotype; 3, *F. lacrimulae*, female paratype. Scales 1 mm.



Figs. 4, 5. Adult *Bucculatrix* spp. — 4, *B. multicornuta*, male paratype; 5, *B. macrogathos*, male paratype (head reconstructed). Scales 1 mm.

Type material. — Holotype ♂: Kazakhstan (western Tyan Shan' mountains), 90 km E Tschimkent, H - 1300 m, Aksu Dzhabagly Reserve, 11.viii.1987, leg. R. Puplesis (vpu). Paratypes: 60 ♂, 80 ♀, same data as holotype (vpu, RMNH).

Diagnosis. — Closely resembling *S. salicis*, but all cornuti are collected in one basal cluster. In contrast to *S. salicis*, the vinculum of *johanssoni* is longer, and the forewing colour is often distinctly paler.

Male (fig. 1). — Forewing length 2.3-2.6 mm. Head: frontal tuft from white or pale yellow to orange; eye-caps and collar white or creamy; antenna greyish to creamy-brownish. Colour of thorax and forewing extremely variable (fig. 1); coarsely scaled, irrorated with brown scales. Cream costal and dorsal spots on forewings of varying shape; an additional large basal spot is sometimes present. Cilia cream. Hindwing and its cilia pale brownish to almost cream. Abdomen brown, underside cream. Anal tufts cream.

Female. — Also variable, usually slightly paler than male, but otherwise similar.

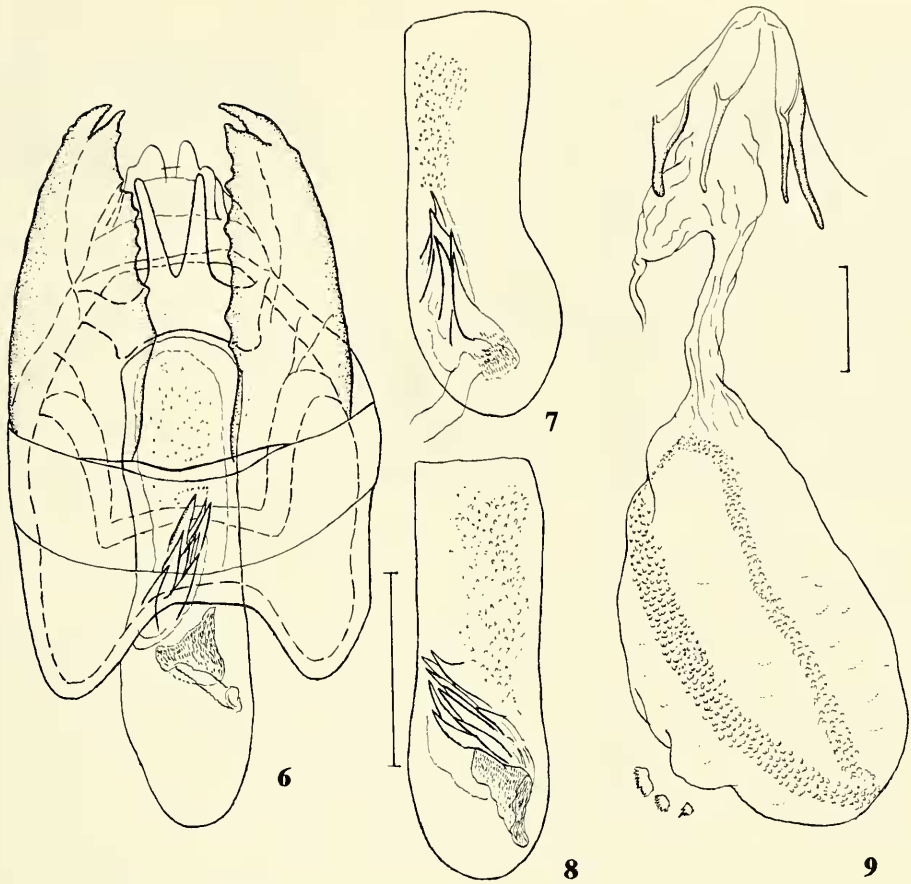
Male genitalia (figs. 6-8). — Valva with two short pointed distal processes. Transtilla without sublateral processes. Uncus with deep, square medial emargination and paramedial notches. Gnathos with long horns, closely set at base. Vinculum comparatively longer than in *S. salicis*, with wide lateral lobes. Aedeagus (figs. 7, 8) shorter than genital capsule, with about 9 cornuti in one basal cluster; cornuti spine-like, rather weakly sclerotized. Further vesica with extensive group of tiny spines.

Female genitalia (fig. 9). — Apophyses long, almost equal in length, or anteriores slightly longer than posteriores. Corpus bursae with sparse pectinations and a distinct band of scallop-shaped minute plates. Ductus spermathecae without spines. Ovipositor slightly protruding, tip almost pointed.

Biology. — Host-plant: *Salix* sp. All specimens have been caught with a light trap, in a small canyon near the Dzhabagly river. The trap was surrounded by a dense vegetation of *Salix*. On these trees we found numerous empty leaf-mines, supposedly of this species. The mine is a broad gallery, occasionally forming a false blotch. The black frass deposited in a broad and irregular central line. Adults have been collected in August, but probably fly in early summer as well, because some very old empty mines were found in August.

Distribution. — Western Tyan Shan' mountains (southern Kazakhstan) (fig.28).

Etymology. — This species is named in honour of Mr. Roland Johansson (Växjö, Sweden), specialist of Nepticulidae, and outstanding painter of these moths.



Figs. 6-9. *Stigmella johanssoni*, genitalia. — 6, Male, holotype; 7, 8, Aedeagus, two different paratypes; 9, Female, paratype. Scales 0.1 mm.

Fomoria flavimacula sp. n.
(figs. 2, 10-15, 28)

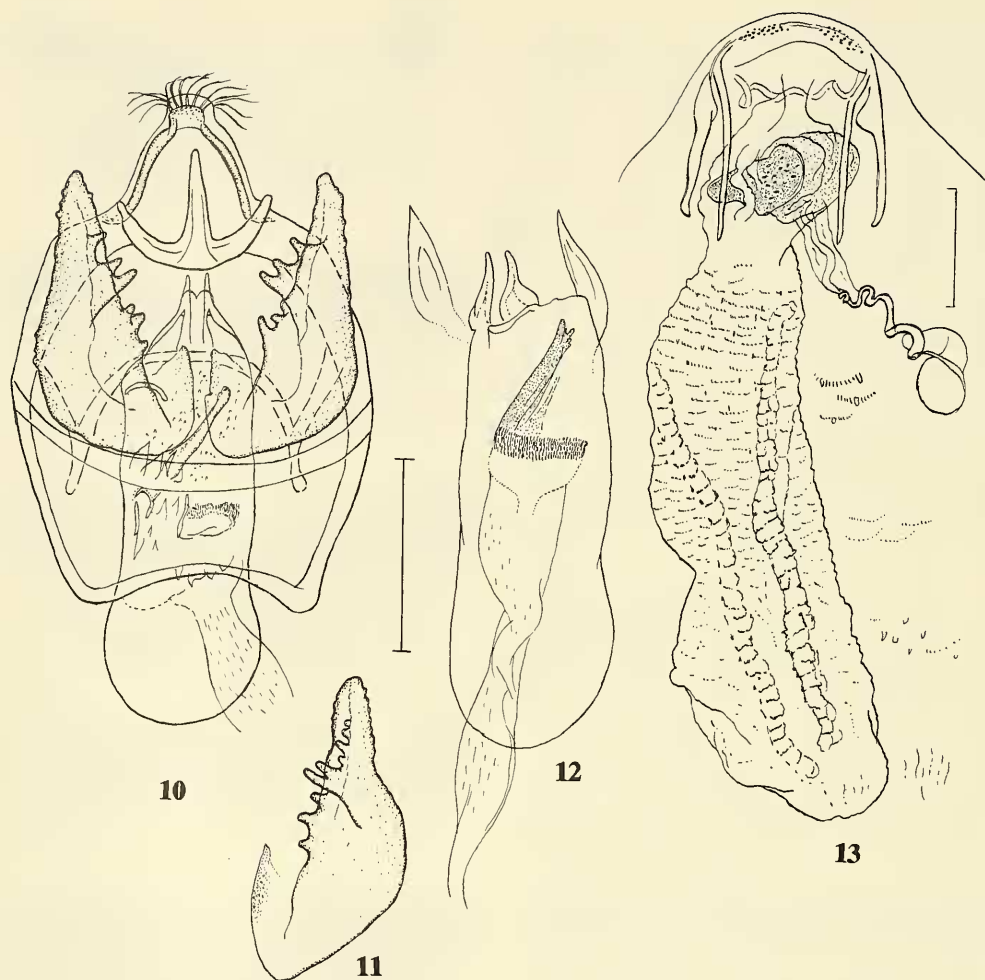
Type material. — Holotype ♂: southern Tadzhikistan, Tigrovaya Balka Reserve (= env. of Dzhalikul'), 26.vii.1990, leg. R. Puplesis (VPU). Paratypes: 2♂, 1♀, same locality, 26.vii-17.viii.1990, leg. R. Puplesis; 1 ♀, central Tadzhikistan, 30 km N Dushanbe (Kondara), larvae on *Populus* sp., 17.vii.1991, N 4241, leg. R. Puplesis & A. Diškus (VPU).

Diagnosis. — The male cannot be mistaken because of the combination of a white tornal spot at two-thirds of the forewing and the peculiarly shaped hindwing with yellowish cream androconial scales. The female resembles *F. septembrella* (Stainton) which also has a tornal spot, but differs by the shape of the duc-

tus spermathecae. Male genitalia easily recognizable from all other *Fomoria* species by medial processes of valva and slender posterior process of gnathos.

Male (fig. 2, left side). — Forewing length 1.6-1.8 mm. Head: frontal tuft orange to pale orange; eye-caps densely covered or just irrorated with fuscous black scales on upperside; collar pale brown cream to cream; antenna varying from mixed grey with cream to almost fuscous. Thorax and forewing blackish fuscous, scales with pale bases. Forewing with a white tornal spot at two-thirds. Underside of forewing with silver lustre and with large elongate spot of yellowish cream androconial scales in the basal half. Cilia and hindwing cream. Hindwing very broad at base, clearly cuspidate towards tip; upper surface in basal half with a large spot of yellowish cream or brownish cream androconial scales. Abdomen not examined.

Female (fig. 2, right side). — Frontal tuft cream



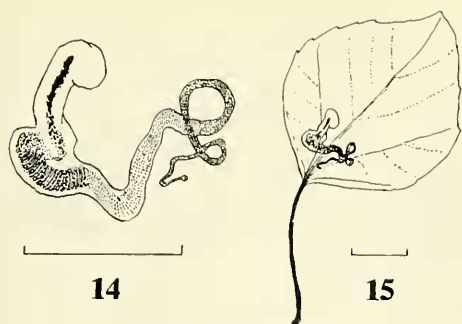
Figs. 10-13. *Fomoria flavimacula*, genitalia. – 10, Male, holotype; 11, Valva, paratype (southern Tadzhikistan); 12, Aedeagus, paratype (southern Tadzhikistan); 13, Female genitalia, paratype (central Tadzhikistan). Scales 0.1 mm.

with some blackish scales distally. Underside of forewing distinctly less silvery lustrous than in male, without androconial spot. Hindwing greyish, not broadened basally and without yellowish spot of androconia. Otherwise as in male.

Male genitalia (figs. 10-12). – Valva triangular, additionally with a triangular, pointed, weakly sclerotized basal process (fig. 11). Inner side of valva with distinct long papillae and processes of varying shape. Transtilla with slender, not very long sublateral processes. Pseuduncus long, rounded distally, but varying in width, with numerous long setae at apex. Uncus in shape of inverted 'v', distally well sclerotized

and with numerous setae. Gnathos with very narrow, long and pointed posterior process. Vinculum large, distally hardly excavated. Aedeagus (fig. 12) with a pair of slender triangular dorsal carinae and a pair of long pointed ventral carinae. Vesica with rather small groups of different cornuti: some of them strongly sclerotized and irregular in shape, other less sclerotized, but triangular or spine-like.

Female genitalia (fig. 13). – Anterior apophyses slightly shorter than posterior ones. Vaginal sclerite sclerotized, with an irregular plate-like shape. Ductus spermathecae with about 4.5 convolutions. Corpus bursae elongate, with distinct pectinations and ex-



Figs. 14, 15. Leaf-mine of *Fomoria flavimacula*. – 14, Gallery with frass; 15, Leaf of *Populus* sp. with leaf-mine. Scales 1 cm.

tremely long but slender signa; they have indistinct borders, the pectinations forming squares.

Biology. – Host-plant: *Populus* spp., probably including *Populus pruinosa* Schrenk, which was particularly common in the type-locality. Egg on upperside of leaf. Larvae were found in July. Mine (figs. 14, 15) starts as a slender sinuous or even contorted gallery almost completely filled with green, occasionally brownish frass; further gallery gradually widening, green or blackish frass neatly coiled; in the last part of gallery frass linear and always black. Exit hole on leaf upperside. Cocoon dark grey-brown. Adults fly in June-August.

Distribution. – Tadzhikistan: mountainous region near the Varzob river (Gissar ridge) and southern Vakhsh river valley (tugai formation) close to Afghanistan (type-locality, fig. 28).

Etymology. – *Flavus* (latin) = golden; *macula* (latin) = a spot, referring to the distinct androconial spot of yellow-cream scales on the male hindwing.

***Fomoria lacrimulae* sp. n.**
(figs. 3, 16-19, 28-30)

Type material. – Holotype ♂: Turkmenistan, western Kopet Dag, 40 km E Kara Kala (=Garrygala), 800 m, 18.v.1993, leg. R. Puplesis & A. Diškus (vpu). Paratypes: 3 ♂, 129 ♀, same locality, 12.v-12.vi.1993, leg. R. Puplesis & A. Diškus (vpu, zITAS).

Diagnosis. – Relatively large species with distinctive male and female genitalia. The male can be easily distinguished from all known species by the very specialized valva with long curved apically process, the extremely long dorsal carinae of aedeagus and the distally truncate uncus. The female is easily recognised by the unusually large apophyses in comparison with the small corpus bursae with special-shaped signa, and the very long ductus spermathecae with 6-7 convolution.

Male (fig. 3). – Forewing length 3.6-3.8 mm. Head: frontal tuft pale brownish orange to cream; eye-caps and collar cream; antenna pale brownish to brown cream. Thorax cream to yellowish, occasionally with some brownish scales. Forewing densely irrorate with brown tipped scales with golden cream (occasionally whitish cream) bases. Dorsal margin of forewing usually completely golden cream, without brown tipped scales. Cilia of both wings golden cream. Hindwing brownish to grey. Abdomen grey to pale brownish cream. Forewing venation with very long subcostal, and four radial, two medial veins, one long (curved upwardly) cubital and an anal vein. Anal loop on base of 2A absent or indistinct, however, the anal vein distinctly bent at the base. Closed cell present. Hindwing venation as in most Nepticulidae.

Female. – Very similar to male, but tends to be a bit smaller, forewing length down to 3.2 mm in some paratypes.

Male genitalia (figs. 16-19). – Valva slender, broadened at base and strongly curved at apex (fig.17), and densely covered with setae (except apex). There are also 5-6 long setae on tip of apical process. Transtilla with very long sublater processes. Pseuduncus broadly triangular. Uncus very wide, truncate, with right angles. Gnathos with broad posterior process and large central plate. Vinculum trapezoid, usually distinctly narrowed distally. Aedeagus (fig.18) with two distinct closely set ventral carinae and with unusually long dorsal carinae. Ventral carinae distally with a ventrally curved, pointed hook; dorsal carinae apically slightly curved outwards. Cornuti almost invisible, although a great number of weakly sclerotized spine-like cornuti is present on vesica (fig.19).

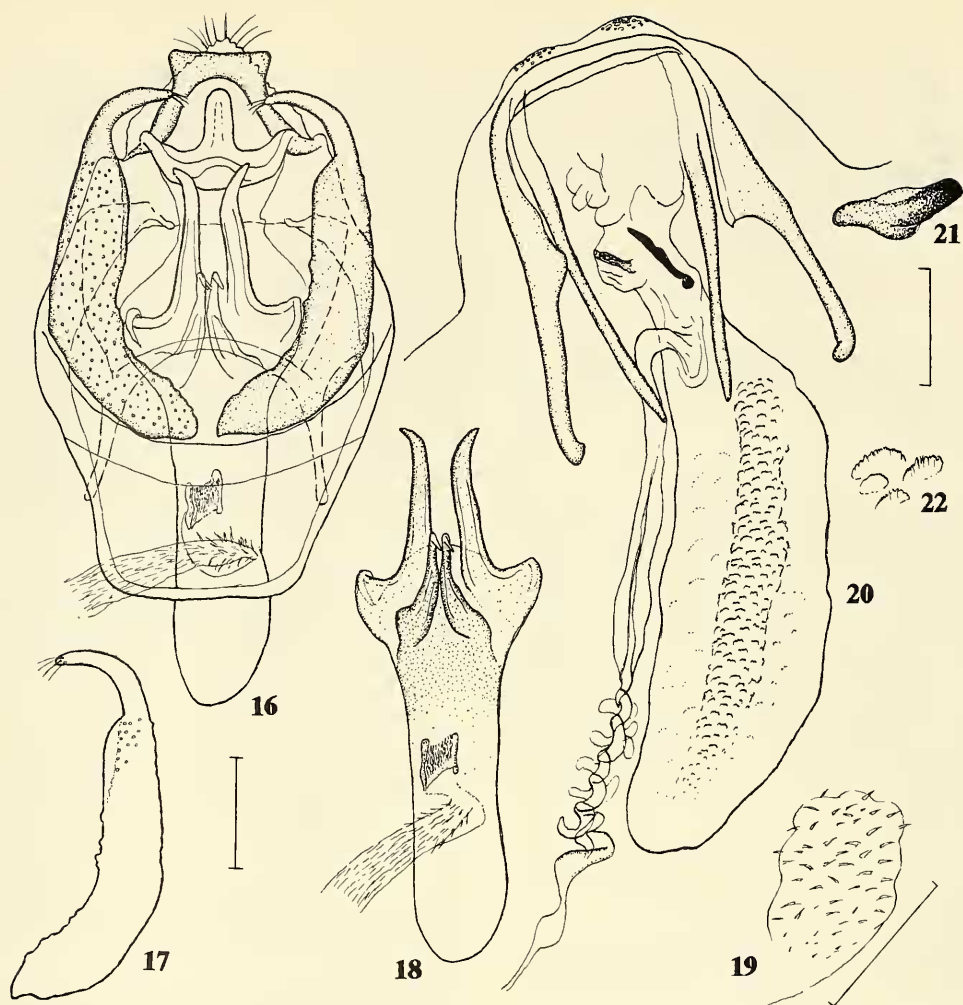
Female genitalia (fig. 20-22). – Both pairs of apophyses very long, almost equal in length. Vaginal sclerite with an irregular shape, sometimes more or less triangular (fig.21), sometimes (in other view) more slender. Corpus bursae comparatively very small, but elongate. Paired signa comprise numerous well sclerotized pectinations (fig.22); borders of signa only weakly marked by elongate pectinations. Ductus spermathecae approximately as long as corpus bursae, with 6.5-7 distinct convolutions. Female abdomen with broad tip; papillae annales rather distinct.

Biology. – Adults fly in May-June (see also remarks).

Distribution. – Known only from the western part of the Kopet Dag ridge in Turkmenistan, where it is a common species (fig. 28).

Etymology. – *Lacrimula* (latin) = a tear-drop, referring to the relatively small distinctly brown tipped scales which densely and uniformly irrorate forewings like small tears.

Remarks. – The collected number of 129 females is



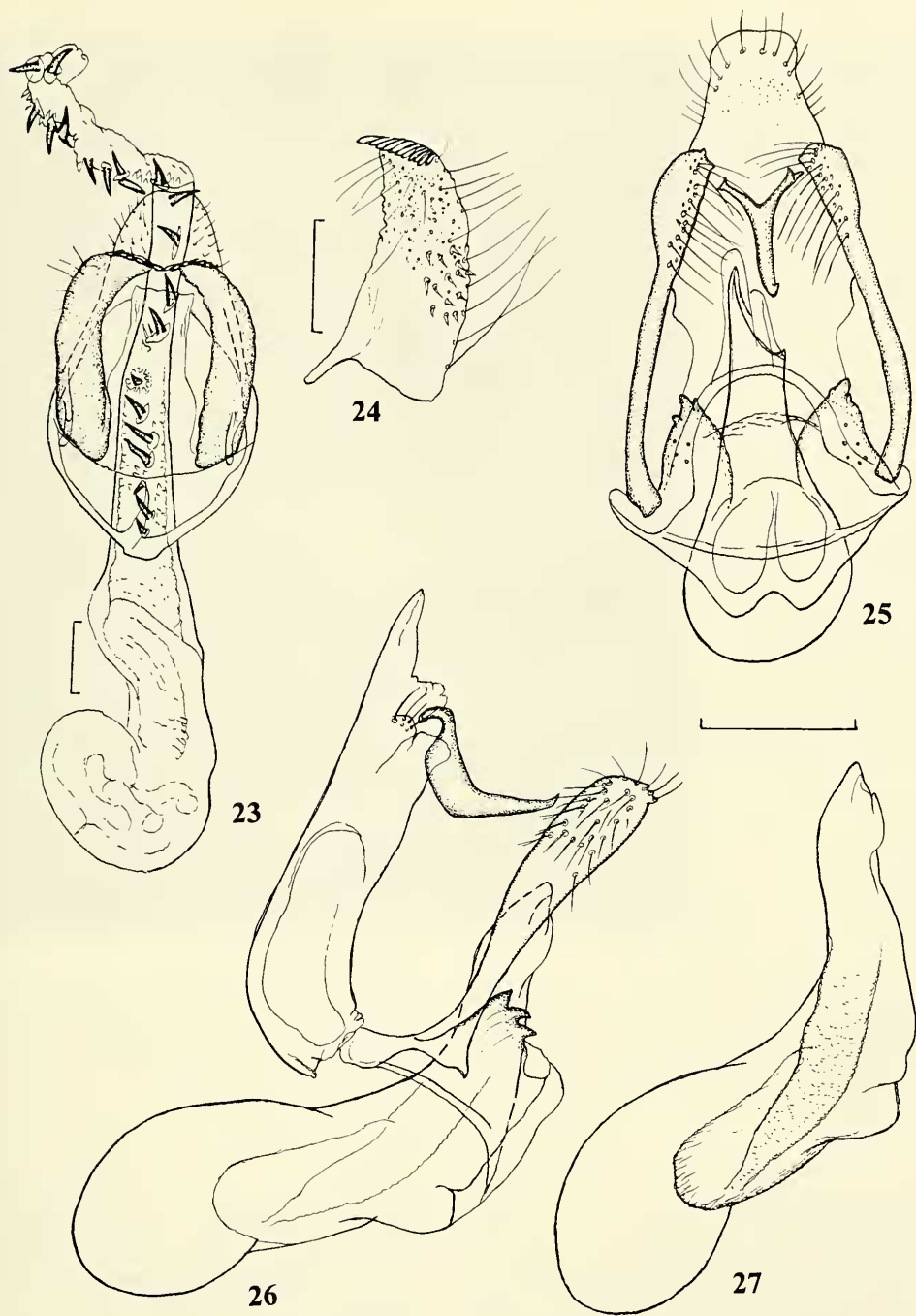
Figs. 16-22. *Fomoria lacrimulae*, genitalia. — 16, Male, holotype; 17, Left valva, holotype; 18, Aedeagus, paratype; 19, Spine-like cornuti on everted vesica, paratype; 20, Female, paratype; 21, Vaginal sclerite, lateral view; 22, Pectinations on corpus bursae. Scales 0.1 mm.

disproportionately high compared with the 4 males. Normally males tend to come at light more frequently. The female abundance might be explained by a trap position very close to the foodplant (Van Nieukerken pers. comm.). The two main sites where the species was collected represent two small, almost parallel canyons (Khoshdemir and Khertou), with a dense herbaceous vegetation and with a predominance of shrubs and trees as *Crataegus*, *Acer*, *Celtis*, *Paliurus*, *Cerasus*, *Rubus*, *Rosa*, as well as *Rhamnus*, *Prunus*, *Salix*, *Fraxinus* and *Zizyphus* (figs. 29,30). Since we did not find any unidentified mines on woody plants, we tend to believe that the hostplant of

F. lacrimulae might be herbaceous. Unfortunately we did not identify the plant species of the very rich herbaceous vegetation during the time of our collecting in May and early June; upon return later the semi-ephemeral grasses were almost completely dried out. Therefore a search for mines would probably best be carried out in late April or early May.

Bucculatricidae

Bucculatrix multicornuta sp.n.
(figs. 4, 23, 24, 28, 29)



Figs. 23-24. *Bucculatrix* spp., male genitalia. — 23, Holotype *B. multicornuta*, ventral view; 24, Valva idem, paratype. 25, Holotype *Bucculatrix macrognaethos*, ventral view; 26, Same, lateral view; 27, Aedeagus, holotype, lateral view. Scales 0.1 mm.

Type material. - Holotype ♂: Turkmenistan, western Kopet Dag, 40 km E Kara Kala (=Garrygala), 800 m, 05.vii.1993, leg. R. Puplesis & A. Diškus (vpv). Paratypes: 7 ♂, same locality, 18.v.-23.vii.1993, leg. R. Puplesis & A. Diškus (vpv).

Diagnosis. - The male can immediately be recognized by the numerous straight cornuti. It can easily be distinguished from the Iranian *B. endospiralis* Deschka, which also has some cornuti by the relatively short vinculum and the much straighter aedeagus (compare Deschka 1981). From the similar *B. abrepita* Seksjaeva, 1989 from East Asia, it differs by the wide valva, and trapezoid tegumen.

Male (fig. 4). - Forewing length 2.8-3.2 mm. Head: frontal tuft mostly whitish, with some dark brown or greyish brown scales; eye-caps whitish; antennae cream, annulate with brown. Thorax brownish cream irrorated with dark brown scales. Forewing variable, irrorated with blackish brown scales, in basal 1/3 somewhat paler, and with 6 whitish cream streaks: three along costal margin and three along anal margin (fig. 4). Cilia cream. Hindwing and cilia brownish cream.

Female. Unknown.

Male genitalia (figs. 23-24). - Valva slightly curved, with 18-20 flat setae at apex, forming a pecten (fig. 24). Sublateral process of valva short. Tegumen large, trapezoid with numerous setae;

tegmina lobes absent. Vinculum triangular. Aedeagus very long, basally widening and less sclerotized. There are about 22-27 well sclerotized spine-like cornuti on the vesica.

Biology. - Adults fly from May till late July. Otherwise unknown.

Distribution. - Only known from the western part of the Kopet Dag ridge (Turkmenistan) (figs. 28, 29).

Etymology. - Multus (latin) = numerous; cornuta (latin) = horned, referring to a very rare feature among the Bucculatricidae, i.e. the presence of numerous cornuti on the vesica.

Bucculatrix macronathos sp.n.
(figs. 5, 25-28)

Type material. - Holotype ♂: eastern Turkmenistan, env. Svintsovy Rudnik (Kugitangtau ridge), 11.viii.1989, leg. V. Sruoga (vpv). Paratype: 1 ♂, same locality, 26.viii.1990, leg. R. Puplesis (vpv).

Diagnosis. - A very remarkable species, immediately recognized by the presence of the large gnathos in the male genitalia and by the pale ochreous tornal spot on the forewing. It is easily distinguished from *B. formosa* Puplesis & Seksjaeva (which also has a gnathos) by the absence of tegmina lobes and the sclerite on the vesica, the short vinculum, as well as by the distinct forewing pattern (compare Puplesis et al. 1992).



Fig. 28. Distribution of *Stigmella johanssoni* (□), *Fomoria flavimacula* (●), *F. lacrimulae* (○), *Bucculatrix multicornuta* (■), *B. macronathos* (▲).



Figs. 29, 30. Habitats of *Fomoria lacrimulae* and *Bucculatrix multicornuta* in the Khoshdemir canyon (western part of the Kopet Dag mountains, Turkmenistan).

29



30

Male (fig. 5). – Forewing length 2.6-2.8 mm. Head unknown, broken in both specimens. Thorax ochreous cream. Forewing with three cream streaks along costal margin, one very wide anal streak and an irregularly elongate tornal spot (fig. 5); in the centre of this tornal spot there is a distinct patch of pale ochreous scales. Hindwing and cilia of both wings ochreous cream.

Female. – Unknown.

Male genitalia (figs. 25-27). – Valva very slender. Basal process of valva not developed, almost indistinct. Tegumen large, without tegminal lobes. Gnathos with large posterior process and small lateral arms. Vinculum short, slightly bilobed anteriorly and with two large triangular lobes posteriorly; each posterior lobe bears 3 well sclerotized tooth-like processes. Aedeagus (fig. 27) much bulged basally, cornuti absent.

Biology. – Adults have been caught in August.

Distribution. – Only known from the Kugitangtau

ridge in eastern Turkmenistan (fig.28).

Etymology. – Macros (greek) = large; gnathos (greek) = a cheek or here; gnathos, referring to the presence of an almost unique feature among the Bucculatricidae, i.e. the well developed gnathos.

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REFERENCES

- Deschka, G., 1981. Blattminierende Lepidopteren aus dem Nahen und Mittleren Osten. IV. Teil. – Zeitschrift der Arbeitsgemeinschaft für Österreichische Entomologen 33: 33-41.
- Nieuwerkerken, E. J. van, 1986. Systematics and phylogeny of Holarctic genera of Nepticulidae (Lepidoptera, Heteroneura: Monotrysis). – Zoologische Verhandlungen, Leiden 236: 1-96.
- Puplesis, R., 1994. The Nepticulidae of Eastern Europe and Asia. – Backhuys Publishers, Leiden, 291 pp., 840 figs.
- Puplesis, R. & A. Diškus, 1995. *Acalyptis argyraspis* sp. n., a remarkable species from Tadzhikistan (Lepidoptera: Nepticulidae). – Phegea 23: 51-54.
- Puplesis, R. & A. Diškus, 1996a. First record of the genus *Etainia* from Central Asia with descriptions of two new species and some provisional notes on the world fauna (Lepidoptera: Nepticulidae). – Phegea 24: 41-48.
- Puplesis, R. & A. Diškus, 1996b. A review of the *Stigmella sorbi* species-group with descriptions of two new species

- from Turkmenistan and Tadzhikistan (Lepidoptera: Nepticulidae). – Phegea 24 (in press).
- Puplesis, R., A. Diškus, R. Noreika & N. Saparmamedova, 1996c. Revised check-list of mining Lepidoptera (Nepticuloidea, Tischerioidea & Gracillarioidea) from Central Asia – Tijdschrift voor Entomologie 139: 191-200.
- Puplesis, R., S. Seksjaeva, J. Puplesienė, 1992. *Bucculatrix formosa* sp. n., a remarkable species from the Kugitangtau Mountains (Central Asia) (Lepidoptera: Bucculatricidae). – Nota Lepidopterologica 15: 41-46.
- Seksjaeva, S. V., 1989. Pervye svedeniya o miniruyushchikh moliakh sem. Bucculatricidae (Lepidoptera) iz Yuzhnogo Primor'ya s opisaniem 10 novykh vydov. – Entomologicheskoe obozreniye 68: 620-627 [In Russian].
- Seksjaeva, S. V., 1993. Obzor krivousykh krokhotok-molei (Lepidoptera, Bucculatricidae) fauny Rossii. – Trudy Zoologicheskogo instituta Rossijskoj Akademii Nauk 225: 99-119 [In Russian].

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